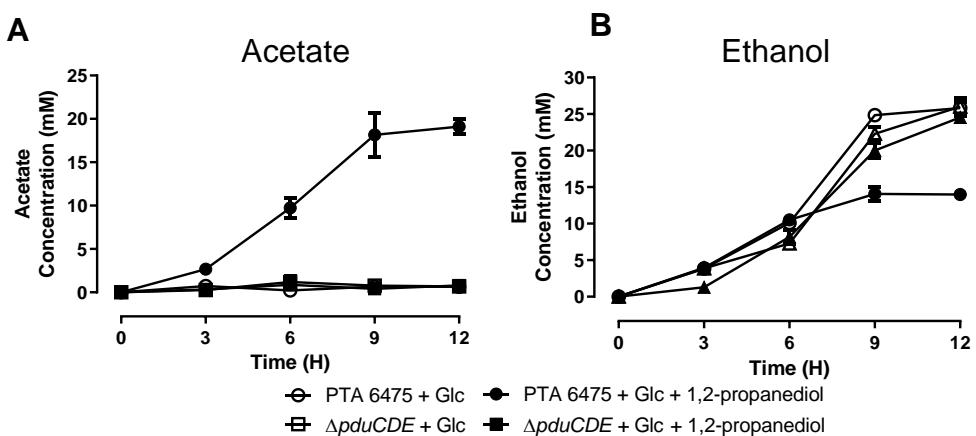


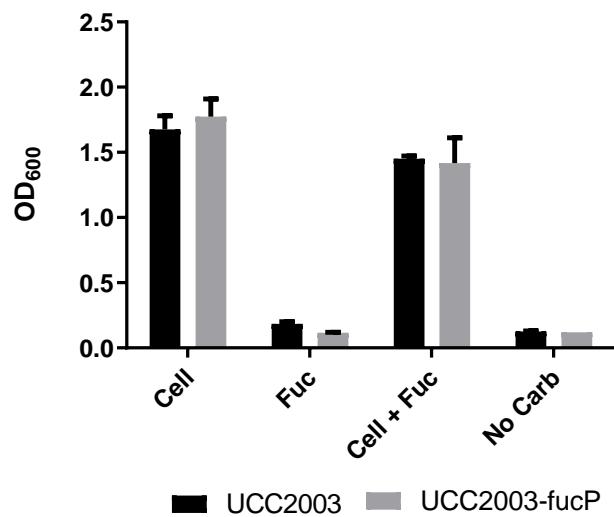
## Supplemental Figures

**Figure S1**

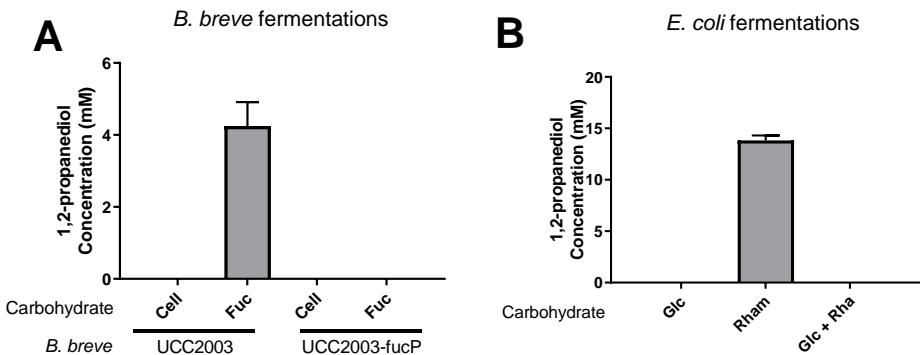


**Figure S1.** Concentrations of (A) acetate and (B) ethanol in media after growth of *L. reuteri* PTA 6475 and *L. reuteri*  $\Delta$ pduCDE on glucose (Glc) in the presence or absence of 1,2-propanediol.

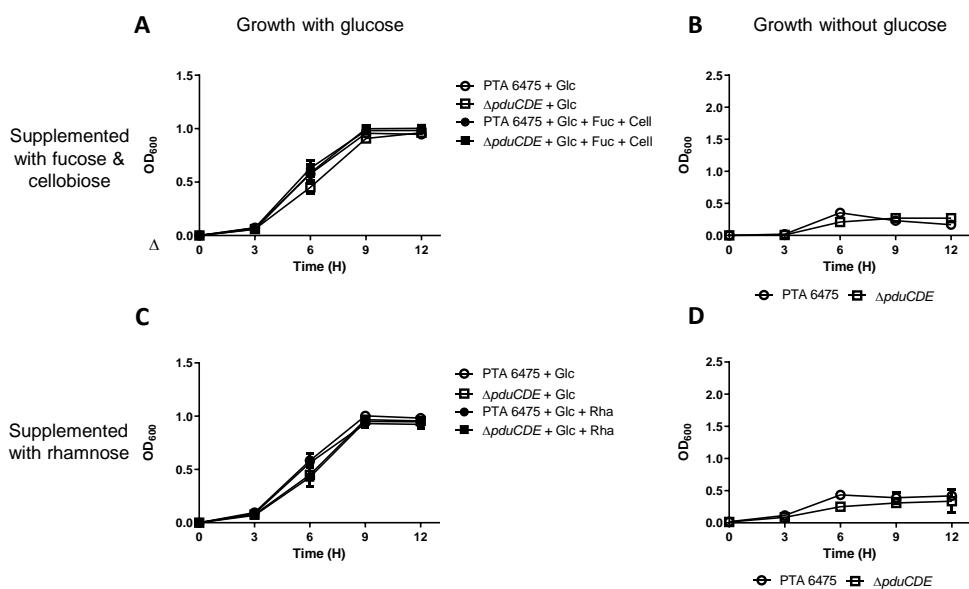
**Figure S2**



**Figure S2.** Growth of *B. breve* UCC2003 and *B. breve* UCC2003-fucP in mMRS supplemented with cellobiose (30 mM; Cell), fucose (30 mM; Fuc), cellobiose and fucose, or with no carbon source (No Carb) after 24 hours.

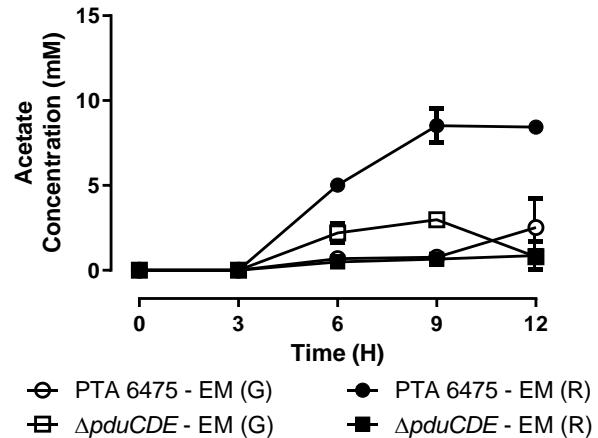
**Figure S3**

**Figure S3.** Total 1,2-propanediol concentrations in media after growth with (A) *B. breve* UCC2003 and *B. breve* UCC2003-fucP after fermentation of cellobiose (Cell) and cellobiose plus fucose (Cell + Fuc). (B) 1,2-propanediol concentrations in *E. coli* cultures after growth with glucose (Glc), rhamnose (Rha), or glucose and rhamnose (Glc + Rha).

**Figure S4**

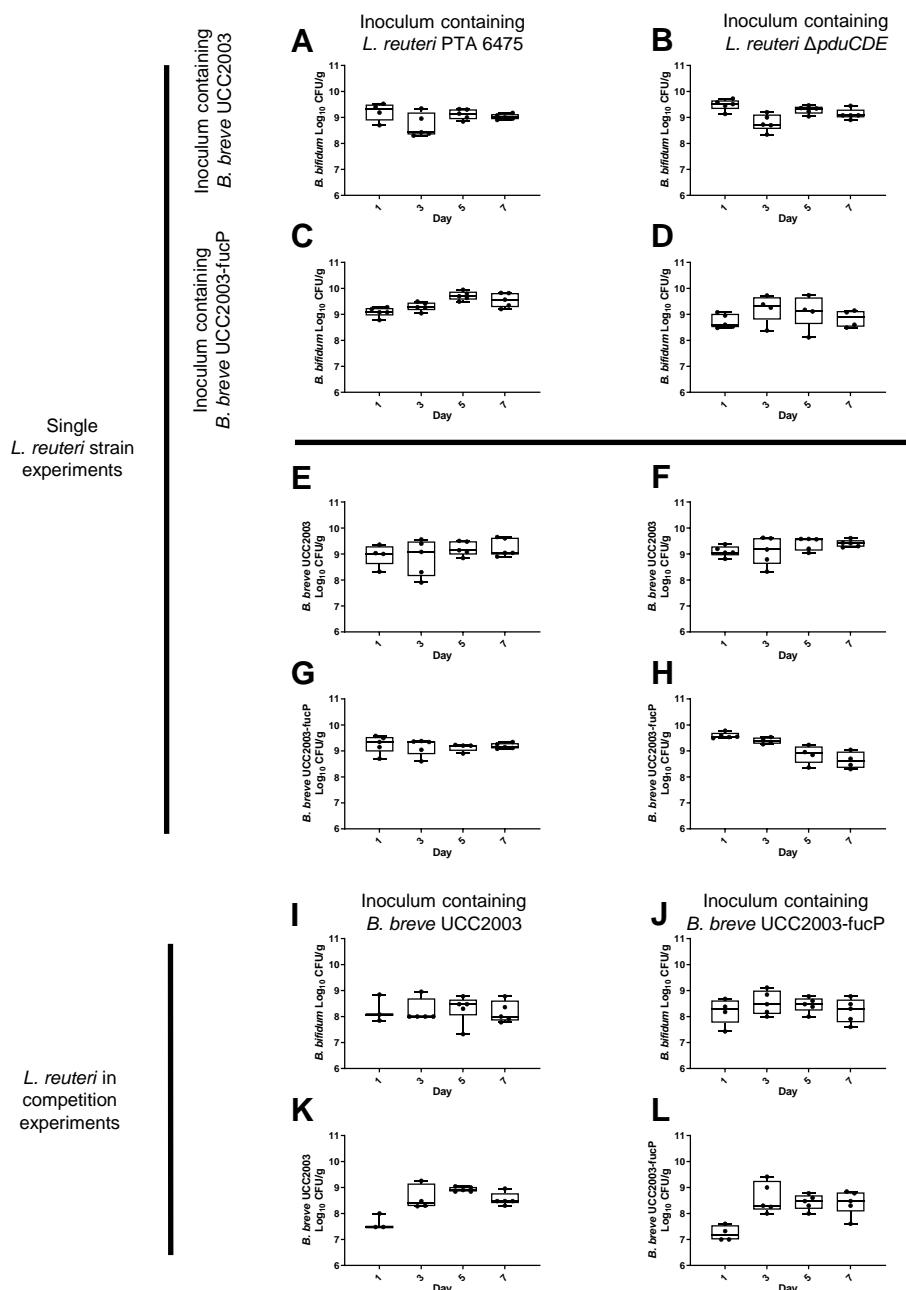
**Figure S4.** Growth of *L. reuteri* PTA 6475 and *L. reuteri*  $\Delta pduCDE$  in the presence of deoxyhexose sugars. *L. reuteri* strains do not utilize (A & B) cellobiose (Cell), fucose (Fuc), or (C & D) rhamnose (Rha) as growth substrates or electron acceptors when cultured with glucose (Glc).

**Figure S5**



**Figure S5.** Acetate production of *L. reuteri* PTA 6475 and *L. reuteri*  $\Delta pduCDE$  in the conditioned media of *E. coli* fermentation of glucose and rhamnose. In the symbol labels, *E. coli* conditioned media is abbreviated as EM, followed by fermentation of glucose by *E. coli* as indicated with (G), and rhamnose with (R) (See Table 1 for more details about media used in the study).

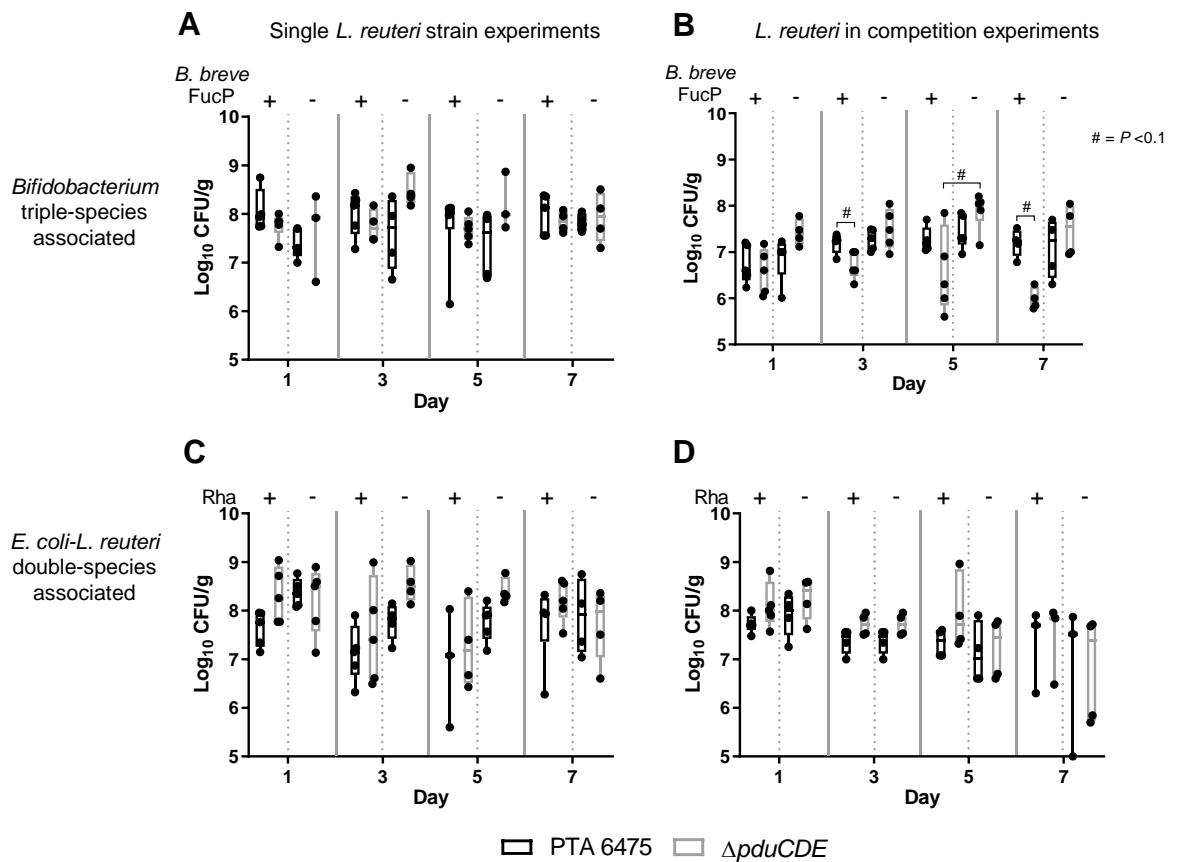
**Figure S6**



**Figure S6.** Quantification of *Bifidobacterium* strains in fecal samples from triple-species associated gnotobiotic mice. Fecal CFU of *B. bifidum* PRL2010 recovered from of gnotobiotic mice inoculated with (A) *B. breve* UCC2003 and *L. reuteri* PTA 6475 or (B) *B. breve* UCC2003 and *L. reuteri* Δ*pduCDE*. Fecal CFU of *B. bifidum* PRL2010 from gnotobiotic mice inoculated with (C) *B. breve* UCC2003-fucP and *L. reuteri* PTA 6475 or (D) *B. breve* UCC2003-fucP and *L. reuteri* Δ*pduCDE*.

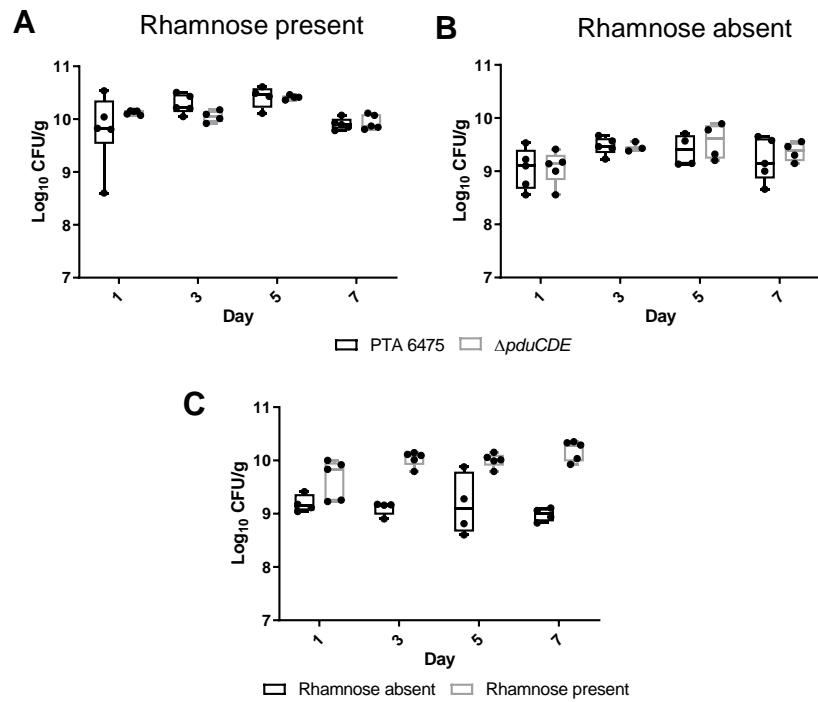
**Figure S6, continued.** Fecal CFU of *B. breve* UCC2003 from gnotobiotic mice inoculated with (E) *B. bifidum* PRL2010 and *L. reuteri* PTA 6475 or (F) *B. bifidum* PRL2010 and *L. reuteri*  $\Delta$ pduCDE. Fecal CFU of *B. breve* UCC2003-fucP from gnotobiotic mice inoculated with (G) *B. bifidum* PRL2010 and *L. reuteri* PTA 6475 or (H) *B. bifidum* PRL2010 and *L. reuteri*  $\Delta$ pduCDE. Fecal CFU of *B. bifidum* PRL2010 from gnotobiotic mice inoculated with *L. reuteri* PTA 6475 and *L. reuteri*  $\Delta$ pduCDE in competition as well as with (I) *B. breve* UCC2003 or (J) *B. breve* UCC2003-fucP. (K) Fecal CFU of *B. breve* UCC2003 from gnotobiotic mice inoculated with *B. bifidum* PRL2010 and *L. reuteri* PTA 6475 and *L. reuteri*  $\Delta$ pduCDE in competition. (L) Fecal CFU of *B. breve* UCC2003-fucP from gnotobiotic mice inoculated with *B. bifidum* PRL2010 and *L. reuteri* PTA 6475 and *L. reuteri*  $\Delta$ pduCDE in competition.

**Figure S7**



**Figure S7.** Quantification of *L. reuteri* strains from triple-species and double-species associated gnotobiotic mice experiments. (A-B) CFU of *L. reuteri* recovered from feces of the *Bifidobacterium* triple-species gnotobiotic mice experiments containing either (A) single *L. reuteri* strains or (B) *L. reuteri* strains in competition. “+” indicates mice colonized with *B. breve* UCC2003 and “-” indicates mice colonized with the *fucP* mutant of *B. breve* UCC2003. (C-D) CFU of *L. reuteri* recovered from feces of *E. coli* double-species gnotobiotic mice experiments from either (C) single *L. reuteri* strains or (D) *L. reuteri* strains in competition. “+” indicates the presence of rhamnose (Rha) in the diet, while “-” indicates absence of rhamnose in the diet.

**Figure S8**



**Figure S8.** Quantification of *E. coli* from double-species associated gnotobiotic mice experiments. CFU of *E. coli* recovered from ‘single *L. reuteri* strain’ bacterial mixtures in the (A) presence of rhamnose in the diet, (B) absence of rhamnose in the diet, and from (C) *L. reuteri* in competition where rhamnose was either supplemented into the mouse diet or not.

## Supplemental Tables

**Table S1.** Strains used in experiments with *Bifidobacterium-L. reuteri* triple-species associated gnotobiotic mice.

Experiment	Inocula	Strain				
		<i>B. bifidum</i> PRL2010	<i>B. breve</i> UCC2003	<i>B. breve</i> UCC2003-fucP	<i>L. reuteri</i> ATCC PTA 6475	<i>L. reuteri</i> $\Delta pduCDE$
<i>Single L. reuteri</i> strain	A	+	+	-	+	-
	B	+	+	-	-	+
	C	+	-	+	+	-
	D	+	-	+	-	+
<i>L. reuteri</i> in competition	E	+	+	-	+	+
	F	+	-	+	+	+

+: present, -: absent

**Table S2.** Strains used in experiments with *E. coli*-*L. reuteri* double-species associated mice.

Experiment	Inocula	Strain			Supplement
		<i>E. coli</i> MG1655	<i>L. reuteri</i> ATCC PTA 6475	<i>L. reuteri</i> $\Delta pduCDE$	
'Single <i>L. reuteri</i> strain'	A	+	+	-	+
	B	+	-	+	+
	C	+	+	-	-
	D	+	-	+	-
<i>L. reuteri</i> in competition	E	+	+	+	+
	F	+	+	+	-

+: present, -: absent